

## " Assignment no 6 ~

Q1

(1)

- Advantages of using glass substrate in magnetic disk :-
- Disk reliability of magnetic disk is increased due to the improvement in uniformity of magnetic film surface.
- Glass substrates helps reduces surface defects and read write errors.
- Glass substrates supports lower fly heights.
- Glass substrates in magnetic disk have better stiffness which helps in reducing disk dynamics.
- Glass substrates helps to withstand damages and shocks of magnetic disks.

(2)

→ Disk tracks, cylinders and sectors :-

→ A disk is divided into tracks, cylinders and sectors.

→ A track is that portion of a disk which passes under a single stationary head during a disk rotation, a ring 1 bit wide.

→ A cylinder is comprised of a set of tracks described by all the heads (on separate platters) at a single seek position. Each cylinder is equidistant from the centre of the disk.

→ A track is divided into segments of sectors which is basic unit of storage.

(3)

- Seek time, rotational delay, transfer time :-
- Accessing a sector on a track on a hard disk takes a lot of time.
- Seek time measures the delay for the disk head to reach the track.
- A rotational delay accounts of the time to get to the right sector.
- A transfer time is how long the actual data read or write takes.
- Rotational speed measures in revolutions per minutes or RPM. partially determines the rotational delay and transfer time.

(4)

→ Define The Seven Raid Levels :-

- 0: Non redundant
- 1: Mirrored: every disk has a mirror disk containing the same data.
- 2: Redundant via hamming code; an error correcting code is calculated across corresponding bits on each data disk and bits of code are stored in bit position on multiple parity disk.
- 3: Bit Interleaved parity; similar to level 2 but instead of error correcting code, a simple parity bit is computed for the set of individual bit.
- 4: Block-Interleaved parity; A bit by bit parity strip is calculated across corresponding strips on each data disk and the parity bits are stored on parity disk.
- 5: Block Interleaved distributive parity; Similar to level 4 but distributes the parity strips across all disks.
- 6: Block Interleaved dual distributive parity :- Two different parity calculations are carried out and stored in separate blocks on different disks.

(5)

→ How is Redundancy achieved in RAID systems :-

→ RAID 1 differs from RAID 2 level in a way as redundancy is achieved.

→ In other levels some parity is used to introduce redundancy.

→ In RAID 1 redundancy is achieved by duplicating all the data.

(6)

→ Optical Disk Products :-

→ CD: A non erasable disk that stores digitized data, The standard uses 12 cm disk and can record 60 minutes of playing time.

→ CD-ROM :- Also a non erasable disk that can hold 650 Mb's of data.

→ CD-R: Similar to CD-ROM, The user can write to the disk only once.

→ CD-RW: Similar to CD-R but user can erase & rewrite disk multiple times.

→ DVD: A type of optical media used for storing digital data, same size as of CD but has much more storing capacity.

(7)

- CD R/W Operations:
- The read & write R/W is a file attribute or permission that can be given to files and directories that allows them to be read or written. These attributes can also be taken away to prevent file from being read or modified.
- R/W is a CD media first introduced in 1997 that is capable of being written to and read. Unlike a traditional CD-R.

(8)

- Diff b/w CD & DVD account for large capacity:
- The greater capacity of DVD is due to 3 reasons:-
- The bits are packed more closely onto DVD. The DVD uses laser with short wavelengths and achieves track spacing of  $0.74 \mu\text{m}$  which is of  $1.6 \mu\text{m}$  on CD. which results in increase of about 4.7GB of capacity.
- A DVD has a second layer of pits and lands on top of first layer. The lasers in DVD can read each layer separately. which increases the capacity upto about 8.5 GBs.

(Q2)

(1)

→ Physical Characteristics of Magnetic Disk System:

→ Fixed Head Disk:

- One read-write head per track.
- Heads are mounted on fixed ridged arm that extends across all tracks.

→ Non Removable Disk:

- Permanently Mounted.
- The hard disk is non removable disk.

→ Moveable Head Disk:

- One R/W head.
- Head is mounted on an arm.
- The arm can be extended or retracted.

→ Removable Disk:

- Can be removed and replaced.
- A disk may be moved from one computer to another.

(2)

- Solid State Drive (SSD):
- An SSD is the type of mass storage device similar to a hard disk drive (HDD).
- It supports reading and writing data & maintains stored data in a permanent state even without power.
- Internal SSD connect to computer like a hard drive, using standard IDE or SATA connections.

(3)

- Parallel Access & Independant Access RAID:
- Parallel Access: All members participate in execution of every I/O requests. Typically spindals of all individual drives are synced.
- Independant Access: Each member disk operates independantly so that seperate I/O requests can be satisfied in parallel.



(4)

- Solid State Drive Architecture :-
- It contains the following components.
- Controller: provides SSD with level interfacing and firmware execution.
- Addressing: Logic that performs selection function across flash memory.
- Data Buffer :- High speed RAM memory compo used for speed matching and increased data throughput.
- Logic for error detection & correction.
- Individual NAND flash chips.

(5)

- Issues Peculiar to SSD :-
- There are 2 issues peculiar to SSD not present with HDD.
- SSD performance has a tendency to slow down as device is used.
- Flash memory becomes unusable after a certain number of writes.

(Q3)

→ Diff the following :

→ Mag disk read & write mechanism :

W/ READ :- The data on a magnetic disk is read and written using a magnetic processor.

Data is organized on a disk in the form of tracks and sectors where tracks are circular divisions of the disk.

Tracks are further divided into sectors that contain blocks & Data.

(2)

→ CAV and multiple zone recorded system :-

→ For the CAV system the number of bits per track is constant. An increase in density is achieved with multiple zone recording in which the surface is divided into a number of zones with zones farther from the centre containing more bits than zones close to centre.

(3)

## SSD & HDD :-

→ SSD :-

- have a copy speed of 220-550 Mbps.
- They draw less power average which increases battery life.
- They are mostly not larger than 512 GB for notebooks & 1TB for desktops.
- They cost approx 0.50 \$ per GB for 1TB drive.

→ HDD :

- They have copy speed of 50-120 Mbps.
- They draw more power which reduces battery life.
- They are typically 500 GB to 2TB for notebook & upto 4TB for desktop.
- They cost approx 0.15 \$ for GB of a 4TB drive.

(4)

CD & DVD :

- CD : A non erasable disk that stores digitized audio information.
- The standard system uses 12 cm disk and can record more than 60 minutes of playtime.
- They have max size of 680 mbs.
  
- DVD : A technology for producing digitized compressed representation of video information, and also large volume of other digital data.
- 8 & 12 cm diameters are used, with a double sided capacity of 17 GB.
- The basic DVD is read only (DVD-ROM).